ANDROPOV, K.P.; KOROL'KOV, N.P.; CHEREPANOV, A.P.; KONKIN, P.I., redaktor; SRIBNIS, N.V., tekhnicheskiy redaktor

[Armored troops of the U.S.Army; a collection of articles from American military journals. Abridged translation] Bornetankovye voiska armii SShA; sbornik statei iz amerikanskikh voennykh zhurnalov. Sokrashchennyi perevod. Moskva, Voen.izd-vo Ministerstva obor. SSSR, 1956. 336 p. (MIRA 10:1)

(United States--Tanks (Military science))

KALINICHENKO, V.F., kand.tekhn.nauk; KOZLIK, V.I., inzh.; SOV'YAK, M.I., inzh.; BARZILOVICH, Yu.P., inzh.; CHEREPANOV, A.P., inzh.

New communication equipment for mine hoisting. Gor.zhur. no.10:57-59 O '64. (MIRA 18:1)

1. Nauchno-issledovatel'skiy gornorudnyy institut, Krivoy Rog (for Kalinichenko, Kozlik, Sov'yak). 2. Sumskoy zavod elektronnykh mikroskopov i elektroavtomatiki (for Barzilovich, Cherepanov).

CHEREPANOV, A.S., inzhener; SHABASHOV, S.P., kandidat tekhnicheskikh nauk.

Investigating the performance of straight-flute hard-alloy drills in drilling steel. Trudy Ural.politekh.inst. no.63: 45-55 '56. (MLRA 10:2)

(Drilling and boring machinery)

CHEREPANOV, A.V., starshiy kranovshchik

Modernizing RMZ cranes equipped with pneumatic control. Rech. transp. 18 no.5:48-49 My '59. (MIRA 12:9)

1. Cherepovetskiy rechnoy port.
(Cranes, derricks, etc.)

CHEREPANOV, B.

Increase the responsibility for complete utilization of the deadweight capacity of ships. Mor. flot. 24 no.5:8 My '64. (MIRA 18:12)

1. Zamestitel' nachal'nika Chernomorskogo parokhodstva.

SOKHAN', M.; CHEREPANOV, B., red.

[Crimean Province of the Ukrainian S.S.R. in the seven-year period, 1959-1965] Krymskaia oblast' Ukrainskoi SSR v semiletii, 1959-1965. Simferopol', Krymizdat, 1959. 20 l. (MIRA 13:7)
(Crimea--Economic policy)

OLINSKIY, Moisey Yakovlevich; SHLYAPOSHNIKOV, Vladimir Izrailevich; CHEREPANOV, B., red.; FISENKO, A., tekhred.

[Crimea; guidebook-manual] Krym; putevoditel'-spravochnik. Izd.3. Simferopol', Krymizdat, 1959. 169 p. (MIRA 12:11)
(Crimea--Guidebooks)

VORONTSOV, Yevgeniy Andreyevich; CHEREPANOV, B.I., red.; ISUPOVA, N.A., tekhn.red.

[Yalta; reference guidebook] IAlta; putevoditel'-spravochnik. Simferopol', Krymizdat, 1960. 92 p. (MIRA 14:2)
(Yalta--Guidebooks)

KHOKHRYAKOV, Yuriy Alekseyevich; CHEREPANOV, B.I., red.; FISENKO, A.T., tekhn.red.

[Southern shores of the Crimea; an account of the regional lore] IUzhnyi bereg Kryma; kraevedcheskii ocherk. Simferopol', Krymizdat, 1960. 175 p. (MIRA 13:7)
(Crimea--Guidebooks)

CHEREPANOV,B.I., red.; LITVINOV,I.T., tekhn.red.

[Sevastopol; album] Sevastopol'; al'bom. Simferopol', Krymizdat, 1960. 1 v. (MIRA 14:5)

(Sevastopol--Views)

ROMANOV, Mikhail Mikhaylovich; CHEREPANOV, B.I., red.; ISUPOVA, NA.A., tekhn. red.

[Marvellous highway; an essay on the Crimean mountain trolleybus line]Chudesnaia magistral'; ocherk o krymskoi gornoi trolleibusnoi linii. Simferopol', Krymizdat, 1962. 110 p. (MIRA 15:12)

(Crimea--Road construction) (Crimea--Trolley buses)

BYSTRIKOV, A.S.; CHEREPANOV, B.S.

X-ray diffraction examination of the formation of zircon in the system $SiO_2 - ZrO_2 - V_2O_5$. Zhur. neorg. khim. 9 no.5:1197-1201 My '64. (MIRA 17:9)

1. Gosudarstvennyy nauchno-issledovatel'skiy institut stroitel'noy keramiki.

CHEREPANOV, B.S., inzh.

Characteristics of the formation of a zirconium-vanadium pigment. Stek. i ker. 22 no.6:8-12 Je '65. (MIRA 18:6)

1. Gosudarstvennyy nauchno-issledovatel'skiy institut stroitel'noy keramiki Gosstroya SSSR.

LEBEDEV, S.P., doktor tekhn.nauk; CHEREPANOV, B.Ye., inzh.

Economic adjustment of electrical transmission in tractors. Mekh. i elek. sots. sel'khoz. 19 no.4:38-40 '61. (MIRA 14:11)

1. Chelyabinskiy institut mekhanizatsii i elektrifikatsii sel'skogo khozyaystva.
(Tractors--Transmission devices)

CHEREPANOV, Boris Yevgen'yevich; KOGAN, A.S., spets. red.; MAKENSKAYA, Ye.A., red.; FORMALINA, Ye.A., tekhn. red.

[Direct-current engines for trawlers] Priamotochnye mashiny rybolovnykh traulerov. Izd.2., perer. i dop. Moskva, Rybnoe khoziaistvo, 1962. 346 p. (MIRA 15:4)
(Trawls and trawling)

LEBEDEV, S.P., doktor tekhn.nauk; CHEREPANOV, B.Ye., inzh.

Calculation of the excitation of a diesel-electric tractor.
Mekh. i elek. sots. sel'khoz. 20 no.3:29-30 '62. (MIRA 15:7)

1. Chelyabinskiy institut mekhanizatsii i elektrifikatsii sel'skogo khozyaystva.

(Tractors)

LEBEDEV, Sergey Pavlovich, doktor tekhn.nauk, prof.; MUSHKATINA, Bella Borisovna, inzh.; OGORODNIKOV, Ivan Nikolayevich, inzh.; CHEREPANOV, Boris Yeremeyevich, inzh.

Modeling of he electrical transmission system of the DET-250 tractor. Izv. vys.ucheb.zav.; elektromekh. 7 no. 3:332-338 '64. (MIRA 17:5)

1. Zaveduyushchiy kafedroy elektrotekhniki Chelyabinskogo instituta mekhanizatsii i elektrifikatsii sel'skogo khozyaystva (for Lebedev). 2. Kafedra elektrotekhniki Chelyabinskogo instituta mekhanizatsii i elektrifikatsii sel'skogo khozyaystva (for Mushkatina, Ogorodnikov, Cherepanov).

Cherepanov, F.F.

16262 **Electrosparking Process for Grinding Carbide-Tipped Profile Cutters.** F. F. Cherepanov. *Henry Brutcher, Altadena, Calif.,* Trans~~lation no. 3040, 4 p.~~ (From *Stanki i Instrument,* v. 23, no. 4, 1952, p. 31-32.)
Reduction of grinding time; elimination of cracking and chipping due to grinding. Optimum conditions for maximum production. Table, diagrams.

CHEREPANOV, F. F.

USSR/Miscellaneous - Industrial Processes

Card 1/1

Author : Cherepanov, F. F.

Title : Electro-spark stamping of hardened tools

Periodical : Stan. i Instr., No. 5, 29 - 30, May 1954

Abstract : The development of a new electro-spark method of stamping (marking) hardened tools and a special stand for electro-spark stamping operations are described. Experiments showed that the new method is most economical and sixteen-times less difficult than other conventional stamping methods. Illustrations, table.

Institution : ...

Submitted : ...

CHEREPANOV, F.M.

New types of electric fences. Zhivotnovodstvo 20 no.8:81-82
Ag '58. (MIRA 11:10)

1.Zaveduyushchiy kafedroy fiziki Omskogo veterinarnogo instituta
(Electric fences)

CHEREPANOV, F.M., kand.tekhn.nauk

Nonfreezing automatic waterer for swine. Svinovodstvo 13 no.11:35-38 N '59. (MIRA 13:2)

1. Zaveduyushchiy kafedoy fiziki Omskogo veterinarnogo instituta.

(Swine--Watering)

ALEKSANDROV, Yu.; PILIPUSHKO, I.; VOLCHENKO, V.; SENDEROV, I.; LIMARENKOV, L.;
YARKOV, G.; YEMTSEV, I.; KUKHAREV, N.; SHCHEKOTOVICH, P.; BOBOVICH, V.;
CHEREPANOV, G.

They are raising the level of their qualifications. Zashch.rast.
ot vred.i bol. 7 no.5:61 My '62. (MIRA 15:11)
(Plants, Protection of—Study and teaching)

L 6984-66 EWP(k)/EWP(z)/EWA(c)/EWT(m)/EWP(b)/T/EWA(d)/EWP(t) MJW/HW/JD

ACC NR: AP5022401 SOURCE CODE: UR/0369/65/000/004/0455/0460

46

B

AUTHOR: Cherepanova, G. I.

44,55

ORG: Lvov Physicmechanical Institute (Fiziko-mekhanicheskiy institut An UkrSSR, L'vov)

44,55

TITLE: Certain problems associated with austenite recrystallization during high-temperature thermomechanical working of chromium steel

44,55 18 44,55 18 18

SOURCE: Fiziko-khimicheskaya mekhanika materialov, no. 4, 1965, 455-460

TOPIC TAGS: mechanical heat treatment, chromium steel alloy, austenite, metal crystallization

ABSTRACT: The effect of high-temperature thermomechanical working on grain size of 03Kh8-, 27Kh8- and 47Kh8 steels containing 8% chromium was studied. The austenite recrystallization was examined on samples which were rolled during heating to 930°-1060°C (50 and 70% deformation), rolled from 10 sec to 30 min at a constant temperature in the 900-980°C range, quenched in oil or water, and tempered for 1 hour at 100-200°C. The mechanical properties of steel samples and the grain size correlated

Card 1/2

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with the duration of the isothermal rolling. Maximum improvement of the steel mechanical properties is achieved during the initial stages of austenite recrystallization. Further recrystallization results in some loss of the initial improvements, to eventually match the mechanical properties typical for the conventional thermal working of steel. For all three steel types, there was never observed a loss in mechanical strength due to high-temperature thermomechanical working. Orig. art. has: 4 figures and 1 table.

SUB CODE: MM/ SUBM DATE: 04Mar65/ ORIG REF: 003/ OTH REF: 000

Card 2/2

CHEREPANOV, G. P. (Moscow)

"On the pressure of a solid on plates and membranes".

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 January - 5 February 1964.

24.4000

S/179/60/000/03/013/039
E191/E481

AUTHORS: Barenblatt, G.I. and Cherepanov, G.P. (Moscow)

TITLE: About the Effect of the Boundaries of a Body on the Propagation of Cracks in Brittle Failure

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Mekhanika i mashinostroyeniye, 1960, Nr 3, pp 79-88 (USSR)

ABSTRACT: The propagation of cracks at the boundaries of a body possesses certain specific features. Contrary to the propagation of isolated cracks in an infinite medium, in the case of proximity to a boundary an instability invariably arises when the load reaches a critical value. The instability is associated with the instantaneous emergence of the crack at the surface of the body. The problem arises of finding these critical loads. Typical cases of cracks in finite bodies are considered using the solution obtained by a method of successive approximations developed in the papers of S.G.Mikhlin (Ref 1) and D.I.Sherman (Ref 2). At first, an arbitrary system of cracks located along a straight line in an infinite body is considered as a subsidiary problem. The infinite body is subject to a tension load. The case

Card 1/3

S/179/60/000/03/013/039
E191/E481

About the Effect of the Boundaries of a Body on the Propagation of Cracks in Brittle Failure

of a system of cracks symmetrically disposed in relation to an axis normal to the straight line is assumed. A symmetrical load system acting on the internal crack surfaces represents the normal load. A crack near a boundary, when its dimensions are small, can be considered as being near the face of a semi-infinite body. The first approximation consists of identifying the face with the axis of symmetry in the subsidiary problem just defined. Although this approximation does not satisfy the condition of zero stress at the free face, it is shown that for the purposes of the main problem this discrepancy is immaterial. The critical values of the force in the case of a crack at a given depth from the boundary of the body with two concentrated forces applied to opposing points of the crack surface is found to be proportional to the square root of the given depth. Until the critical load is reached, the crack develops without reaching the surface. A crack at right angles to the edges of an infinite

Card 2/3

S/179/60/000/03/013/039
E191/E481

About the Effect of the Boundaries of a Body on the Propagation of Cracks in Brittle Failure

strip is examined when the crack is symmetrical in relation to the strip centre line. There is a critical value of the load configuration below which a stable equilibrium exists in a cracked strip. In an example of a load system consisting of two forces separated by a certain distance and symmetrical about the strip centre line, there is a critical distance below which such an equilibrium exists. This is shown to be about two/thirds of the width of the strip. It is shown that the first approximation used in the present paper is of sufficient accuracy. The second approximation in a typical problem introduces a correction of only 2.5%. There are 9 figures and 9 references, 8 of which are Soviet and 1 English.

SUBMITTED: December 31, 1959

Card 3/3

BARENBLATT, G. I. (Moskva); CH PANOV, G.P. (Moskva)

Destruction of the wedge shape of brittle bodies. Prikl. mat. i mekh. 24 no.4:667-682 Jl-Ag '60. (MIRA 13:9)
(Aerodynamics)

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S/040/61/025/001/006/022
B125/B204

AUTHORS: Barenblatt, G. I., Cherepanov, G. P. (Moscow)

TITLE: The equilibrium and propagation of cracks in an anisotropic medium

PERIODICAL: Prikladnaya matematika i mekhanika, v. 25, no. 1, 1961, 46-55

TEXT: On the basis of the ideas developed by the authors in two earlier papers (Refs. 1, 2), several problems concerning the equilibrium and the propagation of straight cracks in an anisotropic medium are investigated. In this plane deformation of an elastic anisotropic medium, the generalizing Hooke law is assumed: $\sigma_{ij} = b_{ij\beta\gamma}\varepsilon_{\beta\gamma}$ $\left(\varepsilon_{ij} = \frac{1}{2}\left[\frac{\partial u_i}{\partial x_j} + \frac{\partial u_j}{\partial x_i}\right]\right)$. (1.2). The equations of motions read $\frac{\partial \sigma_{i\alpha}}{\partial x_\alpha} = \rho\frac{\partial^2 u_i}{\partial t^2}$ $(i = 1,2)$ (1.1). From (1.1) and (1.2) the dynamic principal equations: $L_{i\alpha}u_\alpha = 0$, $L_{ij} = \frac{1}{2}(b_{i\alpha\beta j} + b_{i\alpha j\beta})\frac{\partial^2}{\partial x_\alpha \partial x_\beta} - \rho\frac{\partial^2}{\partial t^2}\delta_{ij}$ result

Card 1/7

89387

(1.3), where δ_{ij} is the Kronecker symbol. The general solution of (1.3) is $u_1 = L_{22}\Psi_2 - L_{12}\Psi_1$, $u_2 = L_{11}\Psi_1 - L_{12}\Psi_2$ (1.4) with $(L_{11}L_{22} - L_{12}^2)\Psi = 0$ (1.5). The authors here investigate various variants of the mixed problem of the elasticity theory for an anisotropic semiplane, which is at rest in the system of coordinates ξ_1, ξ_2, which moves with the constant velocity v in the direction of the negative x_1-axis. In the steady case there follows from (1.5) $B_{\alpha\beta\gamma\varepsilon}\frac{\partial^4\psi}{\partial\xi_\alpha\partial\xi_\beta\partial\xi_\gamma\partial\xi_\varepsilon} = 0$,

$B_{\alpha\beta\gamma\varepsilon} = A_{11\alpha\beta}A_{22\gamma\varepsilon} - A_{12\alpha\beta}A_{12\gamma\varepsilon}$ (1.8). In addition hereto there is the characteristic equation $B_{\alpha\beta\gamma\varepsilon}\mu^{\delta_{\alpha 1}+\delta_{\beta 1}+\delta_{\gamma 1}+\delta_{\varepsilon 1}}$ (1.9). Furthermore, the elliptic case is investigated, which, according to S. G. Lekhnitskiy, is always given in the static problem. According to L. A. Galin, the general solution of (1.8) is written down in the form $\Psi = 2\mathrm{Re}[F_1(z_1) + F_2(z_2)]$,

89387
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B125/B204

$z = \xi_1 + \mu_1 \xi_2$ (1.11), where F_1 and F_2 are arbitrary analytical functions and μ_1, μ_2, $\bar{\mu}_1$, $\bar{\mu}_2$ are the roots of the characteristic equation. Herefrom it follows for the displacements u_i and the stresses σ_{ij}
$u_i = 2\mathrm{Re}\left[d_{i\alpha}\varphi_\alpha(Z_\alpha)\right]$, $\sigma_{ij} = 2\mathrm{Re}\left[e_{ij\alpha}\varphi'_\alpha(Z_\alpha)\right](\varphi_j(Z_j) = F''_j(Z_j))$ (1.12).
Further, (1.13) holds.

$$
\begin{aligned}
d_{1j} &= -b_{1112} - (b_{1122} + b_{1212})\mu_j - b_{1222}\mu_j^2 \\
d_{2j} &= b_{1111} - \rho v^2 + 2b_{1112}\mu_j + b_{1212}\mu_j^2 \\
e_{11j} &= \mu_j(b_{1112}^2 - b_{1111}b_{1212}) + \mu_j^2(b_{1112}b_{1122} - b_{1111}b_{1222}) + \\
&\quad + \mu_j^3(b_{1122}b_{1212} - b_{1112}b_{1222}) - \rho v^2(b_{1112} + \mu_j b_{1122}) \\
e_{12j} &= (b_{1111}b_{1212} - b_{1112}^2) - \rho v^2(b_{1212} + \mu_j b_{2212}) + \\
&\quad + \mu_j[b_{1111}b_{1222} - b_{1122}b_{1112} + \mu_j(b_{1112}b_{2222} - b_{1212}b_{1122})] \\
e_{22j} &= (b_{1122}b_{1111} - b_{1112}b_{1122}) + \mu_j[b_{2122}b_{1112} - b_{1122}(b_{1122} + b_{1212}) + \\
&\quad + b_{1111}b_{2222} + 2\mu_j b_{2222}b_{1112} + \mu_j^2(b_{1212}b_{2222} - b_{2122}^2)] - \rho v^2(b_{2122} + \mu_j b_{2222})
\end{aligned}
\qquad (1.13)
$$

89387

The equilibrium and propagation... S/040/61/025/001/006/022
B125/B204

In part 2, the general problem for the semiplane, the Rayleigh surface waves, and a moving stamp are investigated. For this purpose, the analytical functions $\omega_1(z) = \int\limits_{-\infty}^{\infty} \frac{\sigma(\xi)d\xi}{\xi - z} = U_1 - iV_1$, $\omega_2(z) = \int\limits_{-\infty}^{\infty} \frac{\tau(\xi)d\xi}{\xi - z} = U_2 - iV_2$ (2.1) according to L. A. Galin, are introduced. $\sigma(\xi_1)$ and $\tau(\xi_1)$ denote the distributions of the normal stresses and tengential stresses on the boundary. With

$$\left(\frac{\partial u_1}{\partial \xi_1}\right)_{\xi_2=0} = \mathrm{Re}\left[\frac{d_{12}e_{12}-d_{11}e_{22}}{2\pi i\Delta} w_1(\xi_1) + \frac{d_{11}e_{21}-d_{12}e_{11}}{2\pi i\Delta} w_2(\xi_1)\right] \quad (2.5)$$

and

$$\left(\frac{\partial u_2}{\partial \xi_1}\right)_{\xi_2=0} = \mathrm{Re}\left[\frac{d_{22}e_{12}-d_{21}e_{22}}{2\pi i\Delta} w_1(\xi_1) + \frac{d_{21}e_{21}-d_{22}e_{11}}{2\pi i\Delta} w_2(\xi_1)\right] \quad (2.6)$$

$$w_1(\xi_1) = \text{v. p.} \int\limits_{-\infty}^{\infty} \frac{\sigma(\zeta)d\zeta}{\zeta-\xi_1} - i\pi\sigma(\xi_1), \; w_2(\xi_1) = \text{v. p.} \int\limits_{-\infty}^{\infty} \frac{\tau(\zeta)d\zeta}{\zeta-\xi_1} - i\pi\tau(\xi_1) \quad (2.7)$$

the steady mixed problem of the dynamic elasticity theory for the anisotropic semiplane can be reduced to the well investigated problem of the Hilbert theory of analytical functions. (See the monographs by

Card 4/7

89387

The equilibrium and propagation... S/040/61/025/001/006/022
B125/B204

N. I. Muskhelishvili and F. D. Gakhov). First, surface waves on the boundary of an anisotropic semiplane are investigated. For their propagation velocity one finds

$$PR - PS\frac{M}{L} + (PS + QR)\sqrt{\frac{N}{L}} - QS\frac{N}{L} = 0 \qquad (2.12)$$

$$P = b_{1111} - \rho v^2, \qquad Q = b_{1122}$$
$$R = b_{2222}(b_{1111} - \rho v^2) - b_{2211}(b_{1212} + b_{1122})$$
$$S = b_{1212}b_{2222}$$

For a stamp moving on the boundary $\xi_2 = 0$ of the anisotropic elastic semiplane with existing Coulomb friction upon the contact surface between stamp and body the boundary conditions read $\sigma_{12} = \sigma_{22} = 0$, $(-\infty < \xi_1 < a,\ b < \xi_1 < \infty)$, $\sigma_{12} = k\sigma_{22}$, $\frac{\partial u_2}{\partial \xi_1} = f'(\xi_1)$, $\int_a^b \sigma_{22}(\xi)d\xi = P$, $a \leqslant \xi_1 \leqslant b$ (2.14). With the stamp velocity approaching the velocity of the surface waves, peculiar resonance phenomena occur with these waves.

Card 5/7

89387

S/040/61/025/001/006/022
B125/B204

The equilibrium and propagation...

At Rayleigh-type velocities, the motion radically changes. In part 3, an isolated straight-lined crack in an orthotropic body with plane deformation along a line of elastic symmetry is then dealt with. According to Keldysh-Sedov, $\omega_1(z) = -\frac{1}{\sqrt{(z-a)(z-b)}}\int_a^b \frac{\sqrt{(t-a)(t-b)}g(t)dt}{t-z}$ (3.3) holds.

For all equilibrium cracks, it holds for the ultimate strength near the end of the cracks that $\sigma_{22} = \frac{K}{\pi\sqrt{s}}$, $(K = \int_0^d \frac{G(t)dt}{\sqrt{t}})$. Here s denotes the distance from the end of the crack, K - the interlinking modulus, G(t) - the distribution of the forces of molecular interlinking within the terminal region of the crack, d - the longitudinal extent of the terminal region. Part 4 then deals with the splitting of the anisotropic body by a thin, absolutely rigid wedge. In front of the wedge, a free crack is formed. The boundary conditions of the corresponding mixed problem are

$$u_2 = 0, \quad \sigma_{12} = 0 \quad (-\infty < \xi_1 < 0)$$

$$\sigma_{12} = \sigma_{22} = 0 \quad (0 < \xi_1 < l_2) \qquad (4.1)$$

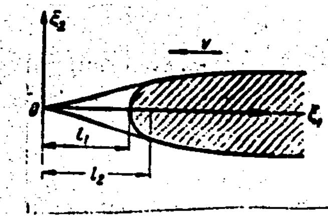
$$\sigma_{12} = k\sigma_{22}, \quad u_2 = -f(\xi_1 - l_1) \quad (l_2 < \xi_1 < \infty)$$

Card 6/7

89387

Here, k is the coefficient of Coulomb friction, f(t) - a function describing the wedge-like shape, l_1 and l_2 may be seen from the figure. Especially, the splitting of an orthotropic body by a wedge of constant thickness is investigated. For the length of the free crack in front of the wedge, one finds $l = p^2h^2/K^2 = h^2/\pi^2 C_o^2 K^2$. For C_o, $C_o = \frac{\varepsilon_1+\varepsilon_2}{2} \frac{\sqrt{b_{1111}b_{2222}}}{b_{1111}b_{2222}-b_{1122}^2}$ (4.5) holds. With an approach of the velocity of motion to the Rayleigh velocity, the length of the free part of the crack tends towards zero, and the propagation velocity of the crack cannot be greater than the Rayleigh velocity. L. A. Galin and Ye. Ioffe are mentioned. There are 1 figure and 14 references: 11 Soviet-bloc and 3 non-Soviet-bloc.

SUBMITTED: July 25, 1960



Card 7/7

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10.7600 3209, 3309, 3007

AUTHORS: Barenblatt, G.I., and Cherepanov, G.P. (Moscow)

TITLE: On brittle cracks under longitudinal shear

PERIODICAL: Prikladnaya matematika i mekhanika, v. 25, no. 6, 1961, 1110 - 1119

TEXT: The general relations are set up. Some particular statical and dynamical problems are discussed. It is assumed that the field of elastic displacements is governed by the equations

$$u, v \equiv 0, w = w(x, y, t), \qquad (1.1)$$

where u, v, w are the components of the vector of elastic displacement. To formula (1.1) corresponds the case of so-called "anti-plane" deformation. The stresses and displacements are expressed by means of the analytic function

$$f(z) = \sum_{k=1}^{n} \frac{F_k + i\mu B_k}{2\pi\mu} \ln(z - a_k) + \varphi(z), \quad \sum_{k=0}^{n} F_k = 0 \qquad (1.6)$$

Card 1/7

where F_k is the resultant force applied to the contour c_k, B_k - the intensity of the "screw dislocation" corresponding to c_k, φ - a univalent analytic function, a_k - an interior point of the contour. In the following, the case $B_k = B = 0$ will be mainly considered. Let an infinite body undergo anti-plane deformations and the constant tangential $\tau_\infty = \tau_\infty e^{i\theta}$ at infinity. The body contains a finite cut of arbitrary shape whose surface is free. In this case,

$$f(z) = \frac{1}{\mu}\tau_\infty e^{-i\theta} g(z) + \frac{\tau_\infty e^{i\theta} R^2}{\mu g(z)} \tag{2.1}$$

where g(z) is a function which maps conformally the exterior of the contour in the z-plane, onto the exterior of the circle of radius R. As an example, a cut with one, respectively two, cracks is considered (see Fig. 1). The mapping function is expressed for these 2 cases by

$$g(z) = \frac{1}{2}Z - \frac{L-r}{2} + \sqrt{\left[\frac{1}{2}Z - \frac{L-r}{2}\right]^2 - \frac{(L+r)^2}{4}} \tag{2.2}$$

and
$$g(z) = \frac{1}{2} Z + \sqrt{\frac{1}{4} Z^2 - L^2} \tag{2.3}$$
respectively, where
$$Z = z + \frac{r^2}{z}, \quad L = \frac{1}{2}\left(r + l + \frac{r^2}{r+l}\right) \tag{2.4}$$
The conditions which determine the length l of the crack, are
$$[(1+\lambda)^4 - 1](1+\lambda)^{-3/2}(2+\lambda)^{-3/2}\lambda^{-1/2} = \frac{M}{\pi\tau_\infty\sqrt{r}} \quad \left(\lambda = \frac{l}{r}\right) \tag{2.5}$$
$$\frac{1}{\sqrt{2}}\sqrt{(1+\lambda)[1-(1+\lambda)^{-4}]} = \frac{M}{\pi\tau_\infty\sqrt{r}} \tag{2.6}$$
with $\lambda \to \infty$, one obtains
$$l = \frac{M^2}{\pi^2\tau_\infty^2}, \quad l = \frac{2M^2}{\pi^2\tau_\infty^2} \tag{2.7}$$
(M is a constant of the material). As an example of a mixed problem, an isolated rectilinear crack is considered ($-l \leqslant x \leqslant l$), part of

23346
S/040/61/025/006/014/021
D299/D304

On brittle cracks under ...

whose surface undergoes the constant displacement $w = \pm h$, whereas the rest of the surface is free. Formulas for the mapping function and the length l are obtained. Interaction between cracks under longitudinal shear: First, the case is considered of an infinite body which undergoes (at infinity) the homogeneous shear stress $\tau_{yz} = \tau_{yz}^{\infty}$, and has an infinite system of similar cracks (see Fig. 4a). In this case,

$$l = \frac{2L}{\pi} \text{arc tg} \frac{M^2}{\pi \tau_{\infty}^{2} L}. \qquad (3.3)$$

Further, a vertical row of cracks is considered (Fig. 4b). Another figure shows the curves

$$\frac{\tau_\infty}{\tau^*} = f\left(\frac{l}{L}\right) \quad \left(\tau^* = \frac{M}{\sqrt{\pi L}}\right)$$

The interaction between cracks varies considerably with crack disposition, Thus, collinear cracks reduce the strength of the materi-

Card 4/6

21346
S/040/61/025/006/014/021
D299/D304

On brittle cracks under ...

al, whereas parallel cracks strengthen it. Curvilinear cracks: With small r, the stress $\tau_{z\theta}$ is expressed by

$$\tau_{z\theta} = \frac{A_1 \cos(\theta/2)}{\sqrt{r}} + A_2 \sin\theta + 0(r^{3/2}) \quad (4.1)$$

where A_1 and A_2 are the coefficients of the expansion terms of f(z). The following hypothesis is adopted: Curvilinear cracks develop in the direction in which $\tau_{z\theta}$ is maximal. Two examples are considered. In fact, only curvilinear cracks which are either almost-linear, can be adequately described by formulas. Dynamical problem of fracture of body. Assume a rectilinear crack travels (with constant velocity V) in an infinite, brittle body. A moving system of coordinates $\xi = x + Vt$, $\eta = y$, is introduced. Thereupon, the equations of motion are

$$\frac{\partial^2 w}{\partial \eta^2} + \left(1 - \frac{V^2}{c^2}\right)\frac{\partial^2 w}{\partial \xi^2} = 0. \quad (5.1)$$

The solution is

Card 5/8

$$w = \mathrm{Re}\,\varphi(\zeta), \quad \zeta = \xi + i\eta\sqrt{1 - \frac{V^2}{c^2}} \tag{5.2}$$

where φ is an analytic function; after determining this function, the formulas for the stress are derived. Thereupon, the formula for the free length l of the crack is

$$h - \int_l^\infty f'(t)\sqrt{\frac{t-l}{t}}\,dt = \frac{M\sqrt{l}}{\mu\sqrt{1-V^2/c^2}} \tag{5.8}$$

where h is the limit value of the function f which represents displacement-distribution. If $f(\xi) \equiv h$, then

$$l = \frac{\mu^2 h^2}{M^2}\left(1 - \frac{V^2}{c^2}\right). \tag{5.9}$$

From (5.9) it is evident that for cracks under longitudinal shear, the limit velocity of propagation is the velocity of sound c, whereas for cracks under transverse shear, the limit velocity is that

Card 6/8 7

of Rayleigh waves. There are 9 figures and 14 references: 8 Soviet-bloc and 6 non-Soviet-bloc. The 4 most recent references to the English-language publications read as follows: F.A. McClintock and S.P. Sukhatme, Traveling cracks in elastic materials under longitudinal shear, J. Mech. and Phys. of Solids, 1960, v. 8, 187 - 193; O.L. Bowie, Analysis of an infinite plate containing radial cracks originating at the boundary of an internal circular hole, J. Math. and Phys., 1956, v. 25; F.C. Roesler, Brittle fracture near equilibrium, Proc. Phys. Soc., 1956, v. B. 69; J.J. Benbow, Cone cracks in fused silica, Proc. Phys. Soc., 1960, v. B. 75, 697 - 699.

ASSOCIATION: Institut mekhaniki Moskovskogo gosudarstvennogo universiteta (Institute of Mechanics, Moscow State University)

SUBMITTED: July 26, 1961

S/179/62/000/001/017/027
E081/E535

24.4200

AUTHOR: Cherepanov, G.P. (Moscow)

TITLE: Stresses in a non-homogeneous plate with slits

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Mekhanika i mashinostroyeniye, no.1, 1962, 131-137

TEXT: The problem discussed is the plane theory of elasticity for an infinite elastic body made of two materials with different elastic properties. At the boundary of the two materials, the conditions of adhesion are satisfied everywhere, except in a certain number of regions in which the stresses or displacements are given. The problem is formulated and solved in terms of Muskhelishvili's complex variable theory. Solutions are given for a plane dividing surface between the two materials, with stresses specified at the slits, or the displacements specified, or with specified stresses at the upper surfaces of the slits and specified displacements at the lower surfaces. The problem of slits along the arc of a circle at the boundary between two media is also solved. The paper is purely

B

Card 1/2

Stresses in a non-homogeneous ... S/179/62/000/001/017/027
E081/E535

theoretical and no numerical examples are given.

SUBMITTED: August 1, 1961

B

Card 2/2

BARENBLATT, G.I. (Moskva); CHEREPANOV, G.P. (Moskva)

Comments on the article "Effect of the boundaries of a body on the development of brittle-breakdown cracks", published in "Izvestiia AN SSSR, OTN, Mekhanika i mashinostroenie," no.3, 1961. Izv.AN SSSR.Otd.tekh.nauk.Mekh.i mashinostr no.1:153 Ja-F '62. (MIRA 15:3)

(Strength of materials)

CHEREPANOV, G.P. (Moskva)

A class of problems in the plane theory of elasticity. Izv.AN SSSR.Otd.tekh.nauk.Mekh. i mashinostr. no.4:61-70 Jl-Ag '62. (MIRA 15:8)

(Elasticity)

S/040/62/026/002/015/025
D299/D301

AUTHORS: Barenblatt, G.I., Salganik, R.L., and Cherepanov, G.P. (Moscow)

TITLE: On the propagation of running cracks

PERIODICAL: Prikladnaya matematika i mekhanika, v. 26, no. 2, 1962, 328 - 334

TEXT: A formula is derived for the rate of propagation of the crack as a function of the applied stress. This formula is discussed as well as the experiments by A.A. Wells and D. Post. An infinite, homogeneous, isotropic, brittle, and elastic body is considered, under a constant stress p. The length $2l_0$ of the initial crack exceeds the critical value, so that the crack starts developing at once. The assumptions are stated with respect to the 2 regions (internal and terminal) into which the crack surface is divided; the distribution of the cohesion forces g(x) is also given. These forces are taken into account in the derivation of the formula for the rate of propagation of the crack as a function of p. After transformations, one obtains the desired formula

Card 1/3

$$\frac{p\sqrt{c}}{R} = \frac{1}{\pi F(m, \nu)}, \tag{2.8}$$

where c, ν and R are material constants, and m = V/c (V being the rate of propagation). Formula (2.8) is plotted for several values of ν. With sufficiently small p, Eq. (2.8) has no solution, so that no uniform-propagation regime exists. With p, larger than the critical value, corresponding to the minimum of the right-hand side of (2.8), there are for each value of p, 2 values of m; to the smaller of the two values corresponds non-stationary crack propagation, whereas to the larger value corresponds uniform propagation. The latter can only occur in the time interval

$$l_0/c < t < T \tag{3.4}$$

where T is the time in which the terminal region develops. With t > T, the cohesion forces can no longer sustain uniform propagation; the rate of propagation increases until it reaches a value at which the crack ramifies; thereupon linear propagation ceases. The above theoretical considerations are in agreement with the experiments by Wells and Post. The quantity R is determined by means of

On the propagation of running cracks S/040/62/026/002/015/025
D299/D301

their experimental data. There are 5 figures and 9 references: 3 Soviet-bloc and 6 non-Soviet-bloc. The 4 most recent references to the English-language publications read as follows: K.B. Broberg, The propagation of a brittle crack, Arkiv för fysik, 1960, v. 18, 159-192; A.A. Wells and D. Post, The dynamic stress distribution surrounding a running crack, -a photoelastic analysis. Proc. Soc. Exper. Stress Analysis, 1958, v. 16, no. 1; G.R. Irwin. The dynamic stress distribution surrounding a running crack, -a photoelastic analysis. Discussion. Proc. Soc. Exper. Stress Analysis, 1958, v. 16, no. 1; G.R. Irwin, Fracture, in "Encyclopedia of Physics", v. 6, 551-590, Springer-Verlag, Berlin, 1958.

ASSOCIATION: Institut mekhaniki Moskovskogo universiteta (Institute of Mechanics of Moscow University)

SUBMITTED: November 30, 1961

Card 3/3

24.4200

S/040/62/026/004/005/013
D409/D301

AUTHOR: Cherepanov, G.P. (Moscow)

TITLE: Elastic-plastic problem under anti-plane strain conditions

PERIODICAL: Prikladnaya matematika i mekhanika, v. 26, no. 4, 1962, 697 - 708

JB

TEXT: The solution in quadratures is considered of the static elastic-plastic problem for the exterior of an arbitrary contour, entirely belonging to the plastic zone, and arbitrarily loaded. Further, the exact solution is considered, for the exterior of a contour, formed by segments of straight lines and of curves, in the case where the straight-line segments are stress-free, whereas the curves are arbitrarily loaded and belong entirely to the plastic zone. The arbitrary contour C is described in the complex z-plane by the equations $x = \xi(t)$, $y = \eta(t)$. The load $\tau_{zn} = k\tau(t)$ is applied to the contour C. The elastic and plastic regions are separated by the contour L. Passing to parametric representation, one

Card 1/3

S/040/62/026/004/005/013
D409/D301

obtains

$$\zeta = \frac{\mu}{k} f'(z), \qquad z = \omega(\zeta). \tag{2.5}$$

A boundary-value problem is obtained for the function $\omega(\zeta)$. This is solved by Schwartz's formula. Further, the following auxiliary boundary-value problem is considered: Determine the function $\omega(z)$, analytic in the upper half-plane $\mathrm{Im} z > 0$, from a nonlinear boundary condition on the real axis. Further, the elastic-plastic problem for the exterior of a contour, formed by segments of straight lines and curves, is considered. This leads to a boundary-value problem of the type considered above. The elastic-plastic problem for a half-plane with a crack of length 1, is considered in more detail. The surface of the crack and the half-plane are stress free, whereas the shear strain τ_∞ acts at infinity. The obtained boundary-value problem is solved by analytic continuation. The integrals in the solutions can be evaluated by asymptotic expansion of the function $z(\zeta)$ in terms of the small parameter $\tau = \tau_\infty/k$. The equation for the boundary of the plastic region is obtained. Finally, the

Card 2/3

Elastic-plastic problem under ... S/040/62/026/004/005/013
D409/D301

elastic-plastic problem is solved for a body which occupies the angular region $\theta_0 > \arg z > -\theta_0$, where $\pi \geqslant \theta_0 > 0$. There are 3 figures. The most important English-language reference reads as follows: F.A. McClintock, Ductile fracture instability in shear, J. Appl. Mech., 1958, 25, no. 4, 582-588 (Russian transl. in Sb. Mekhanika, IL, 1959, no. 5).

SUBMITTED: June 12, 1962

VB

Card 3/3

CHEREPANOV, G.P. (Moskva)

Solution to one of Riemann's linear boundary value problems and its application to certain mixed problems in the two-dimensional theory of elasticity. Prikl. mat. i mekh. 26 no.5:907-912 S-O '62. (MIRA 15:9)

(Functions of complex variables)
(Elasticity)

CHEREPANOV, G.P. (Moskva)

Inverse elastic-plastic problem in the case of antiplane deformation. Prikl. mat. i mekh. 26 no.6:1145-1147 N-D '62. (MIRA 16:1)
(Elasticity) (Deformations (Mechanics))

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S/020/62/147/003/011/027
B104/B186

16.3000
10.7000

AUTHOR: Cherepanov, G. P.

TITLE: On a nonlinear boundary value problem in the theory of analytic functions, occurring in some problems of elasto-plastic deformation

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 147, no. 3, 1962, 566 - 568

TEXT: The boundary value problem is: An analytic function $\omega(z)$ is to be determined in the upper semiplane $\mathrm{Im}\, z>0$ with the boundary conditions

$$|\omega(t)| = \alpha(t) \quad (t \in L); \quad \mathrm{Re}[(a(t) - ib(t))\omega(t)] = 0 \quad (t \in M) \qquad (1)$$

on the real axis t. Here the functions $a(t)$, $b(t)$, and $\alpha(t)$ are continuous almost everywhere, and they satisfy Hölder's condition in the continuous intervals and at infinity $(a + ib \neq 0)$; $L = L_1 + \ldots + L_n$, where L_k is the section $-\infty < a_k \leqslant t \leqslant b_k < \infty$. M is the set of points on the real axis that are not contained in L. It is assumed that $\omega(z)$ is integrable at

Card 1/2

the ends of the sections ($t = a_k$ and $t = b_k$) as well as at the discontinuities of the coefficient $a - ib$ ($t = c_k$) and of the function $\alpha(t)$ ($t = d_k$). A method of solving this problem is shown, whereby the boundary value problem is reduced to the nonlinear Riemannian boundary value problem. The solutions are obtained with methods similar to those developed by N. I. Muskhelishvili (Singulyarnyye integral'nyye uravneniya - Singular integral equations -, M.-L., 1946) and by F. D. Gakhov (Krayevyye zadachi - Boundary value problems -, M., 1958) for linear boundary value problems.

ASSOCIATION: Institut mekhaniki Akademii nauk SSSR (Institute of Mechanics of the Academy of Sciences USSR)

PRESENTED: June 12, 1962, by Yu. N. Rabotnov, Academician

SUBMITTED: May 31, 1962

Card 2/2

CHEREPANOV, G.P. (Moskva)

Inverse elastoplastic problem under plane deformation conditions. Izv.AN SSSR.Otd.tekh.nauk.Mekh.i mashinostr. no.1:57-60 Ja-F '63. (MIRA 16:2)

(Plasticity)
(Deformations (Mechanics))

CHEREPANOV, G.P. (Moskva)

Effect of pulses on the development of initial cracks. PMTF no.1:97-103 Ja-F '63. (MIRA 16:2)
(Deformations (Mechanics))

CHEREPANOV, G.P. (Moskva)

A class of precise solutions of the plane elastoplastic problem. Izv.AN SSSR.Otd.tekh.nauk.Mekh.i mashinostr. no.3:95-103 My-Je '63. (MIRA 16:8)

(Elasticity) (Plasticity)

S/040/63/027/001/017/027
D251/D308

AUTHOR: Cherepanov, G.P. (Moscow)

TITLE: Impressing of an indentor with the formation of cracks

PERIODICAL: Prikladnaya matematika i mekhanika, v. 27, no. 1, 1963, 150-153

TEXT: The author investigates the formation of cracks, due to the impressing of a rigid die, at the angular points of a semi-infinite rectangular cut in an elastic body under two-dimensional strain. It is assumed that the body has a good resistance to compression and shear. The theory of N.I. Muskhelishvili is used to write down the components of the stress tensor and the fundamental relationships between them. Complex variable methods are used to determine the conditions for the formation of cracks at the angular point, and formulas for the length of the crack are derived from the conditions of T.I. Barenblatt (PMM, 1961, v. 25, no. 6). In the case of a smooth die, the area of contact may be found from N.I.

Card 1/2

Impressing of an indentor ... S/040/63/027/001/017/027
D251/D308

Mushkelishvili's conditions. In conclusion, the author discusses the simplified special case of a rectilinear die, with the area of contact given. There are 2 figures.

SUBMITTED: October 2, 1962

Card 2/2

CHEREPANOV, G.P. (Moskva)

Bulging of perforate membranes under tensile stress. Prikl. mat. i mekh. 27 no.2:275-286 Mr-Ap '63. (MIRA 16:4)
(Elastic plates and shells) (Strains and stresses)

L 10080-63 EWP(r)/EWT(m)/BDS--AFFTC--EM S/0040/63/027/003/0428/0435

53

51

ACCESSION NR: AP3003237

AUTHOR: Cherepanov, G. P. (Moscow)

TITLE: On a method of solving the elastoplastic problem

SOURCE: Prikladnaya matematika i mekhanika, v. 27, no. 3, 1963, 428-435

TOPIC TAGS: elastoplastic state of stress, elastoplastic interface, membrane buckling

ABSTRACT: The state of plane stress (or strain) of an infinite elastoplastic solid with a hole whose normal and tangential stresses are arbitrarily distributed on its edges is analyzed. The stresses in infinity are given by polynomial functions. It is assumed that the stresses in the plastic region, which surrounds the hole, depend not on the state of stress in the elastic region but only on the shape of the hole and on the stress distribution on the boundary L between the two regions, on which the stress gradient is continuous. The problem is reduced to finding the contour of L, i.e., to evaluating two analytical stress functions which determine for the given boundary conditions the stress-vector components in the Kolosov-Muskhelishvili formulas of the plasticity theory, used by the author as initial equations. The elastoplastic equilibrium of an infinite plate having a

Card 1/2

2

L 10080-63
ACCESSION NR: AP3003237

circular hole with a constant normal and zero tangential stress applied along its circumference is discussed in detail by using the Tresca--Saint-Venant yield criterion for the plastic region and the Kolosov-Muskhelishvili representation of stresses in the elastic region. It is assumed that the plastic region completely envelops the hole and that the state of stress in infinity is homogeneous. The solution obtained is analyzed, and the boundaries of the existence of the solution are established. It is noted that this solution can be interpreted as a solution of the problem of the buckling of a membrane with a circular hole having constant normal tensile stresses and zero tangential stresses acting upon its circumference, provided the plasticity constant is set equal to zero in expressions for the stress functions. "The author is thankful to L. A. Galin and G. I. Barenblatt for their attention to the article and for discussing it." Orig. art. has: 42 formulas.

ASSOCIATION: none

SUBMITTED: 02Feb63 DATE ACQ: 23Jul63 ENCL: 00

SUB CODE: 00 NO REF SOV: 010 OTHER: 000

gcK/sk
Card 2/2

CHEREPANOV, G.P. (Moskva)

Flow of an ideal fluid with free surfaces in triply connected regions. Prikl. mat. i mekh. 27 no.4:731-734 Jl-Ag '63. (MIRA 16:9)

(Hydrodynamics)

CHEREPANOV, G.P. (Moskva)

Some problems in the theory of cracks in the hydrodynamic formulation. Prikl. mat. i mekh. 27 no.6:1077-1082 N-D '63. (MIRA 17:1)

ACCESSION NR: AP4013387 S/0040/64/028/001/0141/0145

AUTHOR: Cherepanov, G. P. (Moscow)

TITLE: Solution of certain problems in elasticity and plasticity theory with an unknown boundary

SOURCE: Prikladnaya matematika i mekhanika, v. 28, no. 1, 1964, 141-145

TOPIC TAGS: elasticity, plasticity, unknown boundary, bulging membrane, load parameter, recovery point, sungularity, circular opening, normal load, tangent load

ABSTRACT: In previous papers the author constructed solutions of certain elastic-plastic problems and problems on local bulging of a membrane. The obtained solutions exist only up to a definite value of the load parameter (for which there is a recovery point on the unknown boundary). He sought the solution in a class of stress functions bounded everywhere in an elastic region, including the unknown boundary. Here he does not take into consideration the inevitable singularities of the functions caused by the presence of a recovery point on the known boundary, which occurs, for example, in the problem of bulging of a membrane. In the present

Card 1/2

ACCESSION NR: AP4013387

paper he finds solutions for the two indicated problems in a class of stress functions not bounded at certain points of the unknown boundary, which correspond to the recovery points in the first solution. The constructed solutions are an extension of his earlier solutions in the region of large values of the load parameter, coinciding with them only for one value of the load parameter, and when this is exceeded, the solutions of his previous work cease to exist. According to the solutions that are found, there is always a recovery point on the contour of the unknown boundary. In two examples the author demonstrates the method of "patching together" two solutions into one and the appearance of a single solution which is valid in the entire region of variation of the parameters and which apparently has a rather general nature. Orig. art. has: 18 formulas and 1 graph.

ASSOCIATION: none

SUBMITTED: 30Sep63 DATE ACQ: 26Feb64 ENCL: 00

SUB CODE: AP NO REF SOV: 002 OTHER: 000

ACCESSION NR: AP4036715 S/0020/64/156/002/0275/0277

AUTHOR: Cherepanov, G. P.

TITLE: A Riemann-Hilbert problem for external branch cuts along the length or along the circumference

SOURCE: AN SSSR. Doklady*, v. 156, no. 2, 1964, 275-277

TOPIC TAGS: Riemann Hilbert problem, external branch cut, step analytic function, discontinuity coefficient

ABSTRACT: Through a series of mathematical arguments, the author examined a closed solution of Riemann-Hilbert's boundary value problem having discontinuity coefficients for the subject problem. The Riemann-Hilbert problem was reduced to the following:

$$\begin{aligned}
&[a^+(t) + ib^+(t)]\, \varphi_1^+(t) + [a^+(t) - ib^+(t)]\, \overline{\varphi_1^+(t)} = 2f^+(t) \\
&[a^-(t) + ib^-(t)]\, \varphi_1^-(t) + [a^-(t) - ib^-(t)]\, \overline{\varphi_1^-(t)} = 2f^-(t)
\end{aligned} \qquad (2)$$

A step-analytic function $\varphi_2(z)$ was introduced:

Card 1/2

ACCESSION NR: AP4036715

$$\varphi_2(z) = \bar{\varphi}_1(z) \quad (3)$$

It was concluded that in the case of an unbounded derivation at infinity, it was necessary to satisfy the appropriate conditions for solvability. It was shown that the functions $\varphi_1(z)$ and $\varphi_2(z)$ were satisfied by the conditions in equation (3) when the coefficients of the polynomial were real. Orig. art. has: 11 equations.

ASSOCIATION: Nauchno-issledovatel'skiy institut mekhaniki. Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova. Moscow (Scientific Research Institute of Mechanics, Moscow State University)

SUBMITTED: 08Feb63 DATE ACQ: 03Jun64 ENCL: 00

SUB CODE: MA NO REF SOV: 006 OTHER: 000

Card 2/2

CHEREPANOV, G.P. (Moskva)

Pressure of a solid body on plates and membranes. Prikl. mat. i mekh. 29 no.2:282-290 Mr-Ap '65. (MIRA 18:6)

L 08410-67 EWP(m)/EWT(l)/EWT(m)/EWP(k)/EWP(t)/ETI IJP(c) JD/WW/JW/HW/JWD/WE/GD

ACC NR: AT6034254 SOURCE CODE: UR/0000/65/000/000/0083/0090

AUTHOR: Cherepanov, G. P.

72
71

ORG: none

TITLE: Effect of detonation upon solids totally immersed in liquid

SOURCE: AN SSSR. Sibirskoye otdeleniye. Uchenyy sovet po narodnokhozyaystvennomu ispol'zovaniyu vzryva. Sessiya. 5th, Frunze, 1963. Trudy. Frunze, Izd-vo Ilim, 1965, 83-90

TOPIC TAGS: boundary value problem, hydrodynamic theory, detonation, thin plate, fluid dynamics, explosive forming

ABSTRACT: Planar impact problems of hydrodynamics for multiply connected areas are discussed. By using a series of simplifications it is suggested that the solution of the hydrodynamic impact problem may be reduced to the mixed boundary value problem of analytical function theory. It is shown that if the area occupied by the fluid is doubly or triply connected and consists of the sections of straight lines, then the solution of the hydrodynamic impact problem may, in this case, be obtained in a closed form. The problem of the effect of detonation at the fluid surface upon a thin plate immersed in the fluid is studied in detail. Plate velocity after detonation is given as a function of the distance of the plate from the liquid surface, including a special case when the plate is dimensionless. The problem discussed may also be

Card 1/2

L 08410-67

ACC NR: AT6034254

applied in the investigation of explosive forming. Orig. art. has: 20 formulas and 3 figures.

SUB CODE: ~~13~~ 12/ 20/ SUBM DATE: 03Sep65/ ORIG REF: 011/ ATD PRESS: 5103

Card 2/2 LS

L 63962-65 EPA/EWT(m)/EPF(c)/EWP(j)/EWA(c) RPL WW/JW/RM

ACCESSION NR: AP5021313 UR/0040/65/029/004/0794/0795

32
31
B

AUTHOR: Cherepanov, G. P. (Moscow)

44,55

TITLE: On the theory of the normal rate of combustion

21,44,55

SOURCE: Prikladnaya matematika i mekhanika, v. 29, no. 4, 1965, 794-795

TOPIC TAGS: combustion theory, homogeneous steady state combustion, combustion rate, combustion

ABSTRACT: An exact analytical solution is presented for this previously derived system of equations describing the normal rate of a homogeneous steady-state combustion (Zel'dovich Ya. B. K teorii rasprostraneniya plameni. Zh. fiz. khimii, 1948, T. 22, str. 27, No. 1):

$$\left\{ m\frac{du}{d\xi} - \frac{d^2u}{d\xi^2} = \Phi(u)c, \qquad m\frac{dc}{d\xi} - \lambda\frac{d^2c}{d\xi^2} = -\Phi(u)c \right. \quad (-\infty < \xi < \infty) \tag{1}$$

satisfying the following boundary conditions,

Card 1/3

ACCESSION NR: AP5021313

$$
\begin{aligned}
&u(-\infty)=u_-, \quad u(+\infty)=u_+ \quad (u_-<u_s,\ u_+>u_s)\\
&c(-\infty)=v_-, \quad c(+\infty)=0 \quad (v_->0,\ m>0)\\
&\Phi(u)=0 \ \text{at}\ u<u_s, \quad \Phi(u)>0 \ \text{at}\ u>u_s;\ \lambda=D\gamma\rho/k
\end{aligned}
\tag{2}
$$

where m is the normal rate of combustion; u, the temperature of the mixture; c, the concentration of the active ingredient; $c\Phi u$, the rate of the monomolecular reaction; D, the diffusion coefficient; ρ, the density of the substance; γ, its heat capacity; and k, the thermal coefficient. To determine α from the boundary value problem at $0 < \lambda < 1$, the initial system of equations was reduced to obtain:

$$
\frac{dz}{dt}=-1+\alpha f(t)\frac{v}{z}, \quad \lambda\frac{dv}{dt}=1+\frac{t-v}{z}, \quad z=0,\ v=0\ \text{at}\ t=0; \quad z=a\ \text{at}\ t=1 \quad (a>0),
$$

where

$$
f(t)=\Phi(u); \quad f(t)=0\ \text{at}\ t=1, \quad f(t)>0\ \text{for}\ (0,1)
$$

$$
v=\frac{c}{u_+-u_s}, \quad z=\frac{m^{-1}}{u_+-u_s}\frac{du}{d\xi}, \quad t=\frac{u_+-u}{u_+-u_s}, \quad a=\frac{u_s-u_-}{u_+-u_s}, \quad \alpha=\frac{1}{m^2}
\tag{3}
$$

Card 2/3

L 63962-65

ACCESSION NR: AP5021313

Further transformation of the latter system of equations yielded a finite set of equations for z and v, which are analytical functions of variable t and the parameter a. Knowing the Cauchy problem solution for a, the valve of a, which corresponds to the boundary conditions given in (3) when t = 1, must be determined as the positive root of the equation:

$$\sum_{n=1}^{\infty} z_n(a) = a.$$

Orig. art. has: 8 formulas.

[PS]

ASSOCIATION: none

SUBMITTED: 30Mar64 ENCL: 00 SUB CODE: FP

NO REF SOV: 003 OTHER: 000 ATD PRESS: 4071

Card 3/3

L 48327-65 EWT(d) IJP(c)

ACCESSION NR: AP5010154 UR/0020/65/161/002/0312/0314

15
14
B

AUTHOR: Cherepanov, G. P.

TITLE: Boundary value problems with analytic coefficients 16

SOURCE: AN SSSR. Doklady, v. 161, no. 2, 1965, 312-314

TOPIC TAGS: boundary problem, complex variable, functional equation

ABSTRACT: Suppose the complex plane is separated into two regions, D^+ and D^-, by the analytic curve $L = z_0(s)$ where

$$F(f(s)\ \overline{f(s)}, a_1(s), \ldots, a_n(s)) = 0 \qquad (1)$$

f(s) being the value of the desired function on L, analytic in D^- except for a finite number of poles. $a_i(s)$ are functions (some or all may be unknown in advance). F is given. The author proves that if $a_1(s), \ldots, a_n(s)$, F and s(z) (inverse to $z_0(s)$) are analytic with only isolated singular points, and a solution of (1) exists then

$$F(f[s(z)], \overline{f[\overline{s(z)}]}, a_1[s(z)], \ldots, a_n[s(z)]) = 0 \qquad (2)$$

is valid in the z plane, every solution of (2) satisfies (1), and the solution of the original problem belongs to the class of analytic functions having only isolated

Card 1/2

L 48327-65

ACCESSION NR: AP5010154

singular points. He treats three examples--finding $\psi(\zeta)$, $\omega(\zeta)$ analytic in the exterior of the unit circle, U satisfying

$$a_1[\omega(\zeta)]^2 + a_2\omega(\zeta)\overline{\omega(\zeta)} + a_3[\overline{\omega(\zeta)}]^2 = \\ = a_4\varphi(\zeta) + a_5\overline{\varphi(\zeta)} + a_6 \quad \text{for } |\zeta| = 1, \qquad (3)$$

where $a_1, \ldots, a_6$ are complex constants; finding $\omega(\zeta) = u + iv$ analytic outside U satisfying

$$a_1(u^2 + v^2) = a_2uv + a_3 \quad \text{for } |\zeta| = 1, \qquad (4)$$

where a_1, a_2, a_3 are real; and finding $\omega(\zeta)$ analytic outside U and satisfying

$$a_1(\zeta)\overline{\omega(\zeta)} + a_2(\zeta) = \frac{\overline{\omega(\zeta)}}{\omega(\zeta)\,|\omega(\zeta)|} \quad \text{for } |\zeta| = 1, \\ \omega(\zeta) = -\omega(-\zeta), \quad \omega(\zeta) = O(\zeta) \quad \text{for } \zeta \to \infty. \qquad (5)$$

Orig. art. has: 19 formulas.

ASSOCIATION: Institut mekhaniki, Akademii nauk SSSR (Institute of Mechanics, Academy of Sciences, SSSR)

SUBMITTED: 17Oct64 ENCL: 00 SUB CODE: MA

NO REF SOV: 001 OTHER: 000

Card 2/2

L 55959-65 EWT(d) IJP(c) UR/0020/65/161/006/1285/1288

18

B

ACCESSION NR: AP5012755

AUTHOR: Cherepanov, G. P.

TITLE: On an integrable case for the Riemann boundary value problem for several functions

16

SOURCE: AN SSSR. Doklady, v. 161, no. 6, 1965, 1285-1288

TOPIC TAGS: boundary value problem, integral equation

ABSTRACT: It is required to define n piecewise-analytic functions $\varphi_i(z)$ ($i = 1, \ldots, n$) with steps $L+M$, the boundary values of which satisfy the following conditions on the simple smooth contour $L+M$:

$$\varphi_i^+(t) = g_{ik}(t)\varphi_k^-(t) + f_i(t) \quad (t \in L+M),$$

$$\det \| g_{ik}(t) \| \neq 0 \quad (i, k = 1, \ldots, n).$$

where $g_{ik} = 0$ when $i \neq k$ on M, and on L all elements of $\|g_{ik}\|$ except $g_{12}, g_{23}, \ldots, g_{n-1,n}, g_{n1}$ are zero. The functions $g_{ik}(t)$ and $f_i(t)$ are assumed to be piecewise-continuous and to satisfy Hölder's condition on the intervals of continuity. New

L 55959-65

ACCESSION NR: AP5012755

functions are defined with the functions sought and canonical solutions of the Riemann boundary value problem as arguments. The canonical solution of this new problem is defined and the solution found. Orig. art. has: 20 formulas.

ASSOCIATION: Institut mekhaniki Akademii nauk SSSR (Institute of Mechanics, Academy of Sciences SSSR)

SUBMITTED: 22Aug64 ENCL: 00 SUB CODE: MA

NO REF SOV: 007 OTHER: 000

Card 2/2

CHEREPANOV, G.P. (Moskva)

Nature of the "pinch-effect" and some other problems in the theory of fracture. PMTF no.1:139-140 Ja-F '65.

(MIRA 18:8)

APPROVED FOR RELEASE: 06/12/2000 CIA-RDP86-00513R000308410011-3"

L 01219-66 EPA/EPF(c)/EWT(m)/ETC(m)/T/EWP(f) BW/WW/WE

ACCESSION NR: AP5021918 69 UR/0207/65/000/004/0163/0164

AUTHOR: Cherepanov, G. P. (Moscow) 44 44,55

TITLE: Theory of detonation in heterogeneous systems

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 4, 1965, 163-164

TOPIC TAGS: combustion theory, detonation, detonation wave, solid fuel, liquid fuel, detonation velocity

ABSTRACT: A theoretical model is proposed for detonation in heterogeneous systems. Previous studies showed that there is a substantial difference between homogeneous combustion (in which the oxidant and combustible are mixed to form a homogeneous system) and heterogeneous combustion, e.g., in a tube whose walls are covered with solid or liquid fuel and which is filled with air or oxygen. Due to the heat generated behind the primary detonation wave, the evaporation or dispersion of the fuel from the walls into the combustion zone leads to periodic point explosions behind the primary detonation wave. As a result of these explosions, secondary detonation waves are formed. Interaction of the primary and the secondary detonation waves leads to periodic acceleration and deceleration of the primary detonation wave, i.e., to pulsating combustion. Based on the assumption that the average detonation

Card 1/2

L 01219-66

ACCESSION NR: AP5021918

velocity in the combustion zone is equal to the average local speed of sound, and using equations for the conservation of mass, momentum, and energy, the following equation was derived for calculating the detonation velocity in heterogeneous systems:

$$D = \left(\frac{2n-1}{2n}\right)^{1/2} D_0,$$

where D is the detonation velocity in a heterogeneous system; D_0 is the detonation velocity in a corresponding homogeneous system, and n is the number of point explosions behind the primary detonation wave. Orig. art. has: 6 formulas. [PS]

ASSOCIATION: none

SUBMITTED: 06Apr65 ENCL: 00 SUB CODE: WA, FP

NO REF SOV: 003 OTHER: 002 ATD PRESS: 4098

KC

Card 2/2

CHEREPANOV, G.P. (Moskva)

Solution of statically indeterminable elastoplastic problems under complex shift conditions. Inzh. zhur. 5 no.6:1126-1127 '65. (MIRA 19:1)

1. Submitted June 25, 1965.

CHEREPANOV, G.P. (Moskva)

Theory of the normal combustion rate. Prikl. mat. i mekh. 29 no.4: 794-795 Jl-Ag '65. (MIRA 18:9)

L 23437-66 EWT(m)/EWP(w)/T/EWP(t) JD

ACC NR: AP6007580 SOURCE CODE: UR/0040/66/030/001/0082/0093

33

AUTHOR: Cherepanov, G. P. (Moscow)

29

ORG: none

B

TITLE: On the development of cracks in compressed bodies

SOURCE: Prikladnaya matematika i mekhanika, v. 30, no. 1, 1966, 82-93

TOPIC TAGS: material failure, material strength, material, crack propagation

ABSTRACT: The propagation of cracks in a compressed brittle body is studied. The theory of the strength of brittle bodies in compression is applied first to an idealized case of a crack with free edges. The effective closed form solution of the planar problem of elastic theory for "overlapping" cracks is obtained. This base solution is used in deriving the more accurate case of brittle material under compressive loading. It is shown that the strength of brittle bodies in compression is completely determined by the presence of purely shear cracks and certain material constants characterizing the shear strength of the material. A law is established for the direction of propagation of an arbitrary overlap crack and for the mode of failure. The mode of failure is found to be completely

Card 1/2

L 23437-66

ACC NR: AP6007580

4

dependent upon the properties of the material at the tip of the crack. Quantitative relationships for the angles formed by crack intersections are developed. The author thanks S. G. Avershin, V. N. Mosints, and N. G. Yalymov for their comments and G. I. Barenblatt for his attention to the work. Orig. art. has: 3 figures and 42 equations.

SUB CODE: 13,11 SUBM DATE: 30Oct65/ ORIG REF: 010

Card 2/2

L 29827-66 EWT(m)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6011651 SOURCE CODE: UR/0020/66/167/003/0543/0546

AUTHORS: Galin, L. A. (Corresponding member AN SSSR); Cherepanov, G. P.

ORG: Institute of Problems in Mechanics, Academy of Sciences SSSR (Institut problem mekhaniki Akademii nauk SSSR)

TITLE: Self-sustaining failure of a stressed brittle body

SOURCE: AN SSSR. Doklady, v. 167, no. 3, 1966, 543-546

TOPIC TAGS: elastic theory, structural stability, structural property, wave propagation, brittle fracture

ABSTRACT: The following hypothesis is developed: Any body, initially in the uniform stressed condition, then suddenly exposed to conditions in which its surface is freed from loading, undergoes a self-sustaining failure if the potential elastic energy per unit volume of the body exceeds a certain critical value which is a material constant (for similar technology, similar temperature, and other like circumstances). This critical value is of the order $(1/2E)\,\sigma^2_+$, where E is Young's modulus, and σ_+ is the compressive strength of the material. A uniform model is proposed for representing the problem on self-sustaining failure. Principal stresses are defined and the laws of conservation of mass, momentum, and energy are used in

Card 1/2 UDC: 539.8

L 29827-66

ACC NR: AP6011651

the formulation of the model. An additional hypothesis is that the rate of propagation of the failure pulse is equal to the rate of propagation of longitudinal elastic waves in the continuous material. Expressions are developed for the condition of the material immediately in front of the failure pulse, the change in density of the material with the pulse, and the surface energy of the disrupted material. The surface potential may also be expressed as a function of a random variable, the radius of the material particles, which may be defined by a normal distribution. Orig. art. has: 11 equations.

SUB CODE: 20/ SUBM DATE: 02Nov65/

Card 2/2

L 08410-67 EWP(m)/EWT(l)/EWT(m)/EWP(k)/EWP(t)/ETI IJP(c) JD/WW/JW/HW/JWD/WE/GD

ACC NR: AT6034254 SOURCE CODE: UR/0000/65/000/000/0083/0090

AUTHOR: Cherepanov, G. P.

72
71
B+1

ORG: none

2

TITLE: Effect of detonation upon solids totally immersed in liquid

SOURCE: AN SSSR. Sibirskoye otdeleniye. Uchenyy sovet po narodnokhozyaystvennomu ispol'zovaniyu vzryva. Sessiya. 5th, Frunze, 1963. Trudy. Frunze, Izd-vo Ilim, 1965, 83-90

TOPIC TAGS: boundary value problem, hydrodynamic theory, detonation, thin plate, fluid dynamics, explosive forming

ABSTRACT: Planar impact problems of hydrodynamics for multiply connected areas are discussed. By using a series of simplifications it is suggested that the solution of the hydrodynamic impact problem may be reduced to the mixed boundary value problem of analytical function theory. It is shown that if the area occupied by the fluid is doubly or triply connected and consists of the sections of straight lines, then the solution of the hydrodynamic impact problem may, in this case, be obtained in a closed form. The problem of the effect of detonation at the fluid surface upon a thin plate immersed in the fluid is studied in detail. Plate velocity after detonation is given as a function of the distance of the plate from the liquid surface, including a special case when the plate is dimensionless. The problem discussed may also be

Card 1/2

L 08410-67

ACC NR: AT6034254

applied in the investigation of explosive forming. Orig. art. has: 20 formulas and 3 figures.

SUB CODE: 12 20/ SUBM DATE: 03Sep65/ ORIG REF: 011/ ATD PRESS: 5103

Card 2/2

L 06233-67 EWP(e)/EWT(m) WH

ACC NR: AP6030007 SOURCE CODE: UR/0020/66/169/005/1034/1036

AUTHOR: Galin, L. A. (Corresponding member AN SSSR); Ryabov, V. A.; Fedoseyev, D. V.; Cherepanov, G. P.

ORG: Institute of Problems of Mechanics, Academy of Sciences SSSR (Institut problem mekhaniki Akademii nauk SSSR); Institute of Physical Chemistry, Academy of Sciences SSSR (Institut fizicheskoy khimii Akademii nauk SSSR)

29

B

TITLE: Failure in high strength glass

SOURCE: AN SSSR. Doklady, v. 169, no. 5, 1966, 1034-1036

TOPIC TAGS: glass property, Young modulus, hydrofluoric acid

ABSTRACT: The failure of glass due to internal defects was investigated using test samples of window glass with dimensions 60 × 60 mm and a thickness of 1.7-3.2 mm. The glass had approximately the following chemical composition: SiO_2--72%, Na_2O--15%, MgO--3%, CaO--8%, Al_2O_3--1.5-2%. Surface defects to a depth of 100 microns were removed by treating the glass in foaming hydrofluoric acid. The samples were tested for symmetric flexural strength using a maximum load of 10,000 kg-wt. The test samples were supported in a square frame covered with soft insulation. Typical parameters of the glass samples were as follows: Young's modulus of $6 \cdot 10^7$ kg-wt/cm^2, thickness of 0.2 cm, a breaking force of approximately 500 kg-wt, and a characteristic transverse

UDC: 539.8

Card 1/2

L 06233-67

ACC NR: AP6030007

dimension of approximately $5 \cdot 10^{-3}$ cm for the needle fragments. The experiments showed that the development of cracks leading to the failure of high strength glass samples was nonstationary and corresponded to the initial stage of the nonstationary development of cracks from the original defects. Orig. art. has: 4 figures.

SUB CODE: 11/ SUBM DATE: 22Apr66/ ORIG REF: 006/ OTH REF: 002

Card 2/2

L 10894-67 EWT(d)/EWT(1)/EWP(m)/EWT(m)/EWP(w) IJP(c) WVH/WW/EM

ACC NR: AR6033802 (N) SOURCE CODE: UR/0124/66/000/007/B018/B018

35
34

AUTHOR: Cherepanov, G. P.

TITLE: Explosion effect on bodies completely submerged in a liquid

SOURCE: Ref. zh. Mekhanika, Abs. 7B142

REF SOURCE: Tr. 6th Sessii Uch. soveta po narodnokhoz. ispol'z. vzryva. Frunze, Ilim, 1965, 83-90

TOPIC TAGS: hydrodynamics, thin plate, explosion, explosion effect, incompressible fluid

ABSTRACT: Assuming that a given explosion is of short duration and the water or rock in which a given body is located represents an ideal incompressible fluid, it is necessary, for determining the effect of the explosion on the bodies submerged, to solve a two-dimensional impact problem of hydrodynamics which, under certain assumptions, is reduced to a mixed boundary-value problem in the theory of analytical function. It is shown that in a number of cases, the solutions of this problem for a doubly or triply connected region can be obtained in a closed form. For example, for a region bounded by segments of straight lines,

Card 1/2

L 10694-67

ACC NR: AR6033802

a solution is found in previous works of the author; for a doubly connected region, the problem can be solved by mapping out the ring, followed by applying the L. I. Sedov method used for solving a mixed boundary-value for a ring (see L. I. Sedov, Two-dimensional problem of hydrodynamics and aerodynamics. M.—L., Gostekhizdat, 1950). A detailed analysis is made of the problem of the effect of explosion on a liquid surface on a thin plate placed in the liquid. Bibliography of 11 titles. N. N. Kochina. [Translation of abstract]

SUB CODE: 20/

Card 2/2

CHEREPANOV, G.S., inzh.

Scientific conference on the use of progressive techniques and equipment for boring and blasting operations in the mining industry. Shakht. stroi. 8 no.5:30-31 My'64 (MIRA 17:7)

CHEREPANOV, G. S.

BELYAYEV, A.F.

AUTHOR: Solomonov, M.

SOV/24-58-5-30/31

TITLE: Scientific-Method Conference on the Problem of Breaking-up Rocks by Explosions (Pervoye nauchno-metodicheskoye soveshchaniye po probleme drobleniya gornykh porod vzryvom)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 5, pp 143-144 (USSR)

ABSTRACT: On February 24-26, 1958 a conference was held on breaking-up rocks by explosions at the Institute of Mining, Ac.Sc., USSR (Institut Gornogo Dela AN SSSR). 100 people from 32 towns participated and the participants included representatives of Works, Research Institutes of the Ac.Sc. from various parts of the Soviet Union, departmental research institutes and of higher teaching establishments.

construction" by Ye. Yu. Brodov, TsNIIS;
"Industrial production methods of estimating the fragmentation of rock produced by explosive breaking-up in quarries" by G. P. Demidyuk, and G. S. Cherepanov, Institute of Mining, Ac.Sc. USSR;
"Photogrammetric method of evaluating fragmentation of a rock mass" by O. S. Mechikov, Moscow Mining Institute.
In the section relating to the influence of the parameters of explosive fragmentation on the breaking-up of rocks and data of industrial investigations the following papers were presented:
"On the degree of fragmentation of ore and determination of its optimum value" by V. I. Terent'yev, Mining-Geological Station, Ac.Sc., USSR;
"On the first results of applying inclined bore holes of a reduced dimension for explosion ...
rock conditions ...

CHEREPANOV, G.S., inzh.

Advancing on strike in horizontal mining. Shakht. stroi. no.6:9-10 '58. (MIRA 11:6)

(Mining engineering)

DEMIDYUK, G.P., kand.tekhn.nauk; CHEREPANOV, G.S., gornyy inzhener

Evaluation of the yield and extent of oversize according to the data of industrial accounting of the expenditure indices of secondary blasting. Vzryv. rab. no.4:68-74 '60. (MIRA 15:1)

1. Institut gornogo dela AN SSSR.
(Blasting)